ZOOLOGICAL SCIENCE 4: 367–373 (1987)

Spongicola levigata sp. nov., a New Shrimp Associated with a Hexactinellid Sponge from the East China Sea (Decapoda, Stenopodidae)

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ABSTRACT—A new stenopodid shrimp, *Spongicola levigata* sp. nov., is described and illustrated from specimens associated with hexactinellid sponges in the East China Sea.–It is a small species, measuring only 8.3–11.8 mm in body length of the mature female.–This species is unique in the entirely smooth carapace and abdomen, and the lack of telsonal dorsal spines near the articulation with the sixth abdominal somite.–Its affinities with related species and sexual distinctions are discussed.

INTRODUCTION

Six unusual specimens of the stenopodidean shrimp were recently examined. They were found in spongocoels of a certain species of the hexactinellid sponge collected from the East China Sea in about 200 m. This type of sponge is usually known to house a commensal shrimp, *Spongicola venusta* De Haan; in fact, that commensal was collected together during the cruise. The present unusual shrimps are referred to a species of the genus *Spongicola* but their size is much smaller, only 1/3 or 1/4 the length of *S. venusta,* and it apparently represents an undescribed species. The type-series has been deposited in the collection of the Shimonoseki University of Fisheries, Shimonoseki.

MATERIALS

TYPE: Holotype, male, East China Sea, 30°44.7′N, 127°48.3′E, about 200 m deep, 14 June 1978, 13:44–16:30, otter trawl, Koyo Maru, O. Tabeta and K. Hayashi leg. Paratypes, 1 male, 3 ovigerous females and 1 female, collected with holotype.

Accepted October 21, 1986
Received September 9, 1986

DESCRIPTION

Spongicola levigata sp. nov.
(Figs. 1–4)

Diagnosis: Rostrum completely smooth on dorsal and ventral margins, or provided with 1–4 dorsal and 1 ventral processes, all step-like. Carapace glabrous and smooth, lacking grooves and spines. Abdominal terga entirely smooth. Pleura of first to fifth somites broadly rounded without marginal spines. Telson lacking dorsal spines near base, but 3 pairs present on dorsal longitudinal ridges. Chela of third pereopod broad with serration or irregularity on upper and lower margins. Dactyli of fourth and fifth pereopods biunguiculate.

Description: Shell of soft, somewhat membraneous texture. Body slender and glabrous, abdomen rather depressed (Fig. 1).

Rostrum short, falling short of end of first antennular segment (Fig. 2*a*); directed downward or slightly curved downward; triangular in dorsal view, its base considerably wide; distally pointed obtusely; dorsal margin bearing few step-like processes, and ventral margin with one similar process or occasionally entirely smooth. Carapace 4 times as long as rostrum; glabrous and smooth, without any grooves and spines on surface, ante-

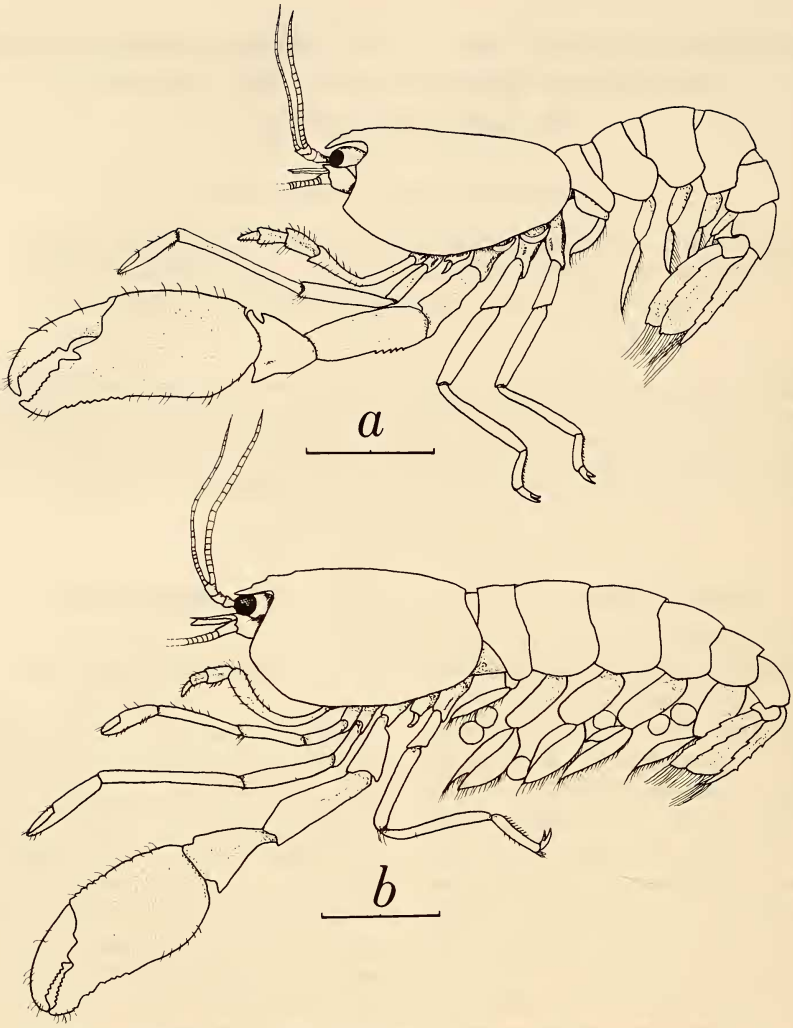

Fig. 1. *Spongicola levigata* sp. nov. from the East China Sea. *a*, Holotype, male, 2.8 mm in cl; *b*, paratype, ovigerous female, 3.2 mm in cl. Scales 2.0 mm.

rior margin also smooth; suborbital or antennal angle obtusely pointed; pterygostomial angle rounded or rectangular, not spiniform (Fig. 2*b*).

Abdomen smooth; first to fifth terga glabrous, sixth tergum with few setae; pleura of first to fifth somites broadly rounded without marginal spines; no spiniform process on sixth somite. Telson broadly lance-shaped, 1.5 times as long as broad, slightly narrowed at base; dorsal surface with pair of longitudinal ridges, each bearing 3 large, posteriorly directed spines; lateral margin with 2–4 pairs of distinct spines; posterior margin fringed with long setae and provided with 3 tiny spines, 2 subterminal flanking median terminal (Fig. 2*c*).

Eyes comparatively large, eyestalk mesially with few spinules near cornea (Fig. 2*a*). Antennular peduncles simply elongate; basal segment more than twice as long as second segment; stylocerite small, ending in sharp point. Antennal scale broad and semi-circular, about twice as long as broad; outer margin almost straight, with 4 or 5 spinules on anterior half, terminal one largest; inner margin

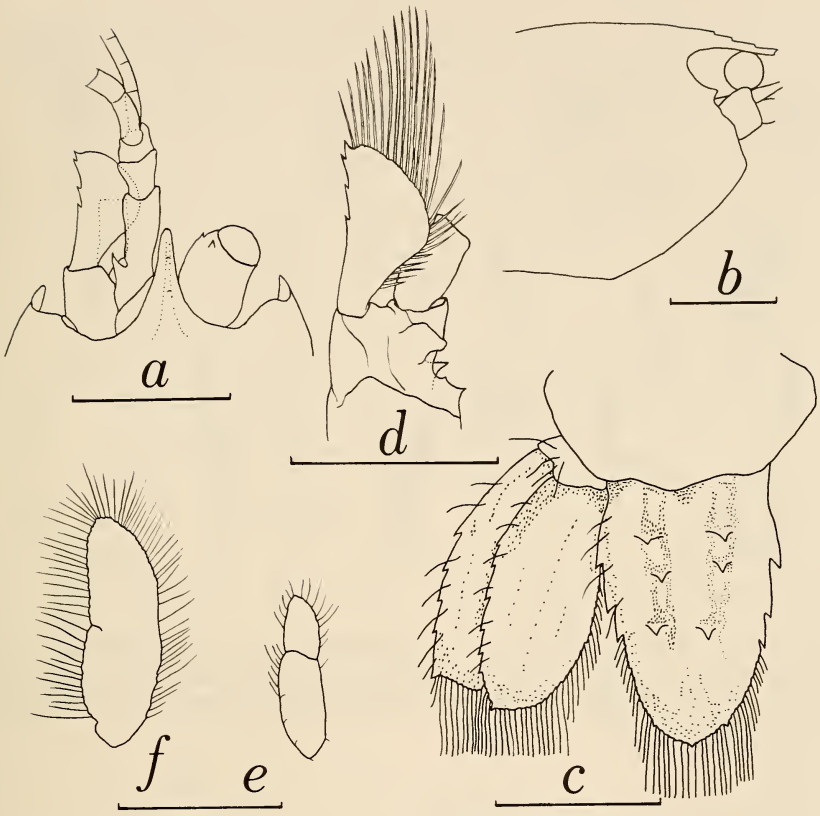

FIG. 2. *Spongicola levigata* sp. nov. *a, c, e,* male holotype, 2.8 mm in cl; *b, d, f,* paratype, ovigerous female, 3.2 mm in cl. *a,* Anterior part of body, dorsal view; *b,* anterior part of body in lateral view; *c,* tail fan, right uropod removed; *d,* left antenna; *e,* right first pleopod; *f,* right second pleopod. Scales 1.0 mm.

strongly convex; long setae on inner and distal margins; basicerite dorsomesially with quadrate flap, ventromesially with conspicuous spine near base of carpocerite (Fig. 2*d*).

Mandible with 3-segmented palp; incisor and molar processes fused with each other (Fig. 3*a, b*). Palp of first maxilla slender and simple with 2 apical and few subapical setae (Fig. 3*c*). Palp of second maxilla long and slender; 2 endites each bilobed (Fig. 3*d*). Palp of first maxilliped unilobed with feeble median notch; epipod large and bilobed; distal endite large and unequally bilobed; proximal endite small and unilobed (Fig. 3*e*). Second maxilliped with 5-segmented endopod; epipod bilobed, small globular podobranch present (Fig. 3*f*). Third maxilliped rather stout, especially merus and ischium, setae on distal three segments rigid; epipod slender and partly twisted, exopod extremely short, only bud-like (Fig. 3*g*).

First pereopod slender and chelate; fingers finely pectinate on distal 1/4 of cutting edge; palm about 1.5 times as long as fingers; carpus slightly longer than merus, bearing small subterminal spine on inner side (Fig. 4*a, b*). Second pereopod similar in shape to first pereopod but larger and longer; palm twice as long as fingers; carpus 1.5 times as long as merus (Fig. 4*c*). Third pereopod strongest, sparsely provided with short setae on chela, slightly shorter than body length; lower margin of chela serrate on distal 2/3 of length; upper margin smooth or faintly serrate; fingers distally curving inward, crossing, each ending in sharp point; opposable margin of movable finger with prominent median tooth fitting to large opposing con-

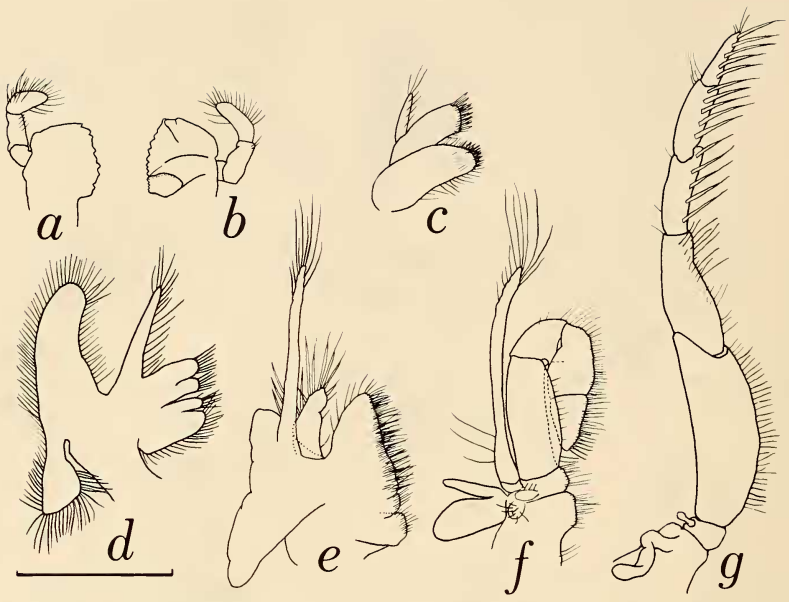

Fig. 3. Mouthparts of *Spongicola levigata* sp. nov. (right side), paratype, ovigerous female, 3.2 mm in cl. *a,* mandible, ventral view; *b,* same, dorsal view; *c,* first maxilla, ventral view; *d,* second maxilla, ventral view; *e,* first maxilliped, ventral view; *f,* second maxilliped, ventral view; *g,* third maxilliped, outer view. Scale 1.0 mm.

cavity; cutting edges distal to snapping part armed with several quadrangular teeth; palm rather massive, roughly quadrate or slightly longer than broad, width as long as dactylus; carpus triangular in lateral view, anterior margin pointed at upper and lower ends; merus armed with 5 spines on posteromedian margin in male, spineless in female; ischium with small spine at anterodistal end (Fig. 4*d, e*). Fourth and fifth pereopods similar, long and slender, sparsely setose; dactylus short, simply biunguiculate, penultimate tooth articulated; propodus 2.5 times as long as dactylus and half as long as carpus, bearing 8–12 spines on posterior margin; carpus slightly longer than merus, armed with 2 small but sharp spines on posterodistal end (Fig. 4*f, g*).

Branchial formula as shown below. Epipods absent from fifth pereopods; exopods well developed on first and second maxillipeds, rudimental on third maxillipeds, absent from pereopods.

	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Pleurobranchs	—	1	1	1	1	1	1	1
Arthrobranchs	—	1	2	2	2	2	2	—
Podobranchs	—	1	—	—	—	—	—	—
Epipods	1	1	1	1	1	1	1	—
Exopods	1	1	r	—	—	—	—	—

First pleopods in male small, composed of 2 segments and feebly setose (Fig. 2*e*), those in female largely unilobed, and fully setose (Fig. 2*f*). Second to fifth pleopods bilobed, each fringed with long setae. Endopod and exopod of uropod each with weak longitudinal dorsal ridge, bearing long setae on inner and distal margins; endopod armed with 4–7 spines on distal 2/3 of outer margin, terminal spine larger; exopod with 6–10 spines on distal half of outer margin, terminal spine relatively large (Fig. 2*c*).

Color: Body almost transparent; cornea light brown.

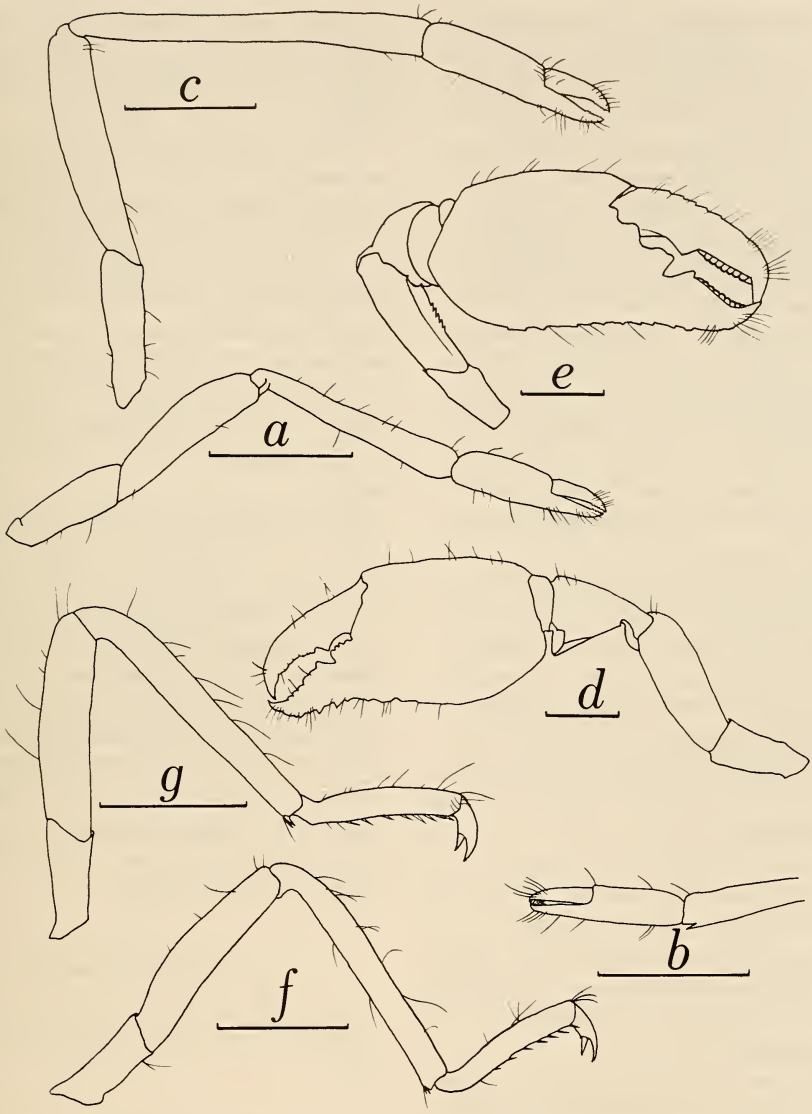

FIG. 4. Pereopods of *Spongicola levigata* sp. nov. *a–d, g,* paratype, ovigerous female, 3.2 mm in cl; *e, f,* male holotype, 2.8 mm in cl. *a,* right first pereopod, outer view; *b,* chela and anterior part of carpus of same, inner view; *c,* right second pereopod, outer view; *d,* left third pereopod, outer view; *e,* right third pereopod, outer view; *f,* right fourth pereopod, outer view; *g,* right fifth pereopod, outer view. Scales 1.0 mm.

Measurements: Holotype, male, 10.0 mm in body length excluding rostrum (BL), 2.8 mm in carapace length excluding rostrum (CL), 9.8 mm in length of right third pereopod. Paratypes, 1 male, 8.8 mm in BL, 2.9 mm in CL; 4 females, 8.3–11.8 mm in BL, 2.7–3.4 mm in CL; smallest ovigerous female, 8.3 mm in BL. Subglobular eggs, 0.4–0.6 mm in diameter.

DISCUSSION

In spite of having the glabrous smooth integu-

ment, the present species may be referred to a species of the genus *Spongicola*. As mentioned by Holthuis [7] and Bruce and Baba [4], *Spongicola* bears well-developed exopods in the first two maxillipeds but rudimental one in the third maxillipeds. Recently Saint Laurent and Cleva [15] slightly modified this definition to include *S. inflata,* which has a normal, well-developed exopod on the third maxillipeds. The gill formula of the present species is exactly the same as shown by Holthuis [7] for *Spongicola* and differs from those of the related genera, *Spongicoloides* [11], *Spongiocaris* [4] and the recently erected *Paraspongicola* [15]. The glabrous, smooth integument unique to the present species is, however, shared with some species of *Spongicoloides* [7, 11]. The chela of the third pereopod in this species also represents the feature of *Spongicola.*

The known species and subspecies of the genus *Spongicola* retain several teeth or spines on the rostrum and carapace, with rather fair regularity. In most of the species, the rostrum bears a few to several dorsal and a single ventral spines; the carapace is also provided on each side with 1 postrostral, 1 hepatic, 1 antennal, and some small spines on both the anterior margin and the pterygostomial region directly inside of it. The present new species, however, is entirely devoid of the carapacial spines and grooves. Even the antennal or suborbital angle is reduced to an obtuse process. The dorsal margin of the rostrum bears a few step-like processes, none of which ends in a sharp point; occasionally they are absent, even the ventral marginal one.

In almost all species of *Spongicola,* the abdominal pleura are more or less serrated marginally, and telson bears 2 pairs of spines near the articulation with the sixth abdominal somite, in addition to the dorsal pairs on the longitudinal carinae [1, 7, 14, 15]. In the present new species such spines or processes are barely recognizable, only excepting the last mentioned ones.

The sexual distinctions in this species are apparent in the third pereopods and the first pleopods. In the male about 5 spines are distinct on the posteromedian margin of the third pereopods, while they are absent in the female. The first pleopod is a single lobe without articulation in the female, instead of being composed of 2 segments in the male; the marginal setae in the female are longer and more numerous in the female.

Like the other members of this genus as well as the related genera [2, 4, 7, 9, 15], the present new species is a symbiont of the deep-sea glass sponge. All of the present type series were obtained from the spongocoels of a hexactinellid sponge, probably *Euplectella oweni* Herklots and Marshall. Four of them were found in a pair in 2 different host sponges. The female is larger than the paired male; in one pair the female is 11.8 mm in body length and the male is 10.0 mm and in the other pair the female is 10.8 mm and the partner is 8.8 mm.

Other examples of this sponge found in the same trawl haul accommodated the other common stenopodid, *S. venusta* De Haan; a total of 18 (6 pairs and 6 singles) specimens were collected. *S. venusta* was recorded from Japan, Korea, the East China Sea and the Philippines at the depths of 174–315 m [3, 5–8, 10, 12, 13, 15, 16]. *S. levigata* and *S. venusta* may be readily distinguished from each other at the field by the size difference. The former is only 1/3 or 1/4 of the latter and is probably the smallest among the species of this genus, being only 8.3 mm in body length of the smallest ovigerous female.

ACKNOWLEDGMENTS

We thank Dr. K. Baba of the Kumamoto University, Kumamoto, Japan, for his critical review of the manuscript.

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